The Madras Forest College Magazine.

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THE
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N. B:-Contributors are requested to send in their contributions typed or written legibly in ink on one side of the paper only.—Editor.

Ourselves.

The Madras Forest College started on the Hill Tour on the 15th April and returned to head quarters on the 16th of May. The Junior Division spent the month at Ootacamund and the Senior Division at Bandy Shola, Coonoor.

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The Juniors studied the exotics on the Nilgiris—the different Eucalypti, Pines, Cupressus and other gymnosperms. One compartment of blue gum was marked for thinning in Muthinad to extract wood for the manufacture of charcoal. A sample-plot was opened in Aramby to see the effect of selection coppice in blue gum. The Eucalyptus punctata on the Aramby plantation was thinned by taking out 25% of the trees. A sample-plot was opened on the area, wherein, 50% of the growing stock was removed.

* * * * *

A road was aligned in the Muddanah blue gum plantation, for the construction of which, an estimate will be furnished to the District Forest Officer.

The Senior Division had its Final Survey Practical Examination. The students prepared the plates and submitted them in camp. The number of days for the examination was reduced this year, to give more scope for practical work in Sylviculture and Engineering.

Mr. Richmond, the District Forest Officer of the Nilgiris, was kind enough to take the students to inspect a road under construction on the Coonoor Peak. This afforded an opportunity for learning what theory could not very well teach. Mr. Richmond impressed on the students the various details which they should pay attention to as Rangers while carrying out such works.

The road was aligned by the students of the Madras Forest College in 1915. The records and estimates for about Rs. 10,000 were furnished for the execution of the work. The work was taken on hand about the beginning of the current year.

Certain deficiencies in execution gave scope for learning how not to do things. Though mistakes are possible in the first instance, an opportunity like the present, gave occasion to students to realise the possible mistakes that could be committed, and to understand how they could be avoided. Theory combined with practice during the college course is not the be all and end all of a Ranger's course. His post graduate course begins when he leaves the college. He must be observant and attentive to all details till he gains experience and gains confidence that he is able to carry out works entrusted to him.

Without meaning any offence to the officer directly in charge of the work, a few points are mentioned for the benefit of the readers.

Before starting the work or entrusting the work to a contractor, it is important to check the alignment, however recently it may have been done, as there is always the risk of the pegs being removed or displaced. The width for cuttings and the depth should be indicated by pegs on the ground. In the case of depth of cuttings, holes should be dug and pegs should be driven in the holes, so that the top of the peg is in level with the formation surface. In the case of embankments, pegs should be put in, up to the top of which the original surface has to be raised.

The Range Officer being primarily responsible for the proper execution of the work, he should never allow the contractor to have his own way. He should check the pegs frequently, as otherwise the contractor will move the pegs to the embanked portion and show the embankment as a part of the cutting. It will be difficult to find this out, unless closely supervised, and impossible to detect, after a shower of rain. The Range Officer should fix check pegs and should make his notes on each inspection.

The contractor must be made to complete each item of work, earth work for instance, over the whole length of road beginning from one end and proceeding systematically. Left to himself he will do work in patches, leaving difficult portions untouched and will make out that he has completed certain portion of the road and ask for payment. Lending oneself to the contractor's ways will lead to trouble in all directions—difficulty in checking, in following the estimate, in making payments, in maintaining correct accounts and above all in getting the work done in a satisfactory manner—. The contractor must not be allowed to start a new item of work unless he gets orders and unless provided for in the estimate.

In the present case, the contractor had put up culverts—several of them kutcha—on his own initiative, when they have not been provided for in the estimate and where there are not required. The consequence is that he would not get paid for them. Further the contractor either by removing the pegs or for some reason had cut deeper than is necessary. As a result the gradients were not as were proposed they should be. In consequence, the ground had to be raised by putting loose earth to raise the road surface. This has the disadvantage of losing a hard formation level. In other places he has to cut three feet further down. With closer supervision much of this could be obviated.

Some of the several points that would suggest themselves in the execution of the work are (1) Blasting. It may not be possible to actually determine, while estimating, the volume of rock to be blasted. After the earth work is completed, volume of all hard rock for blasting should be calculated. If this is not done, the volume of the blasted material should be subsequently measured, taking care to see that extraneous material has not been stacked with the blasted rocks. (2) Diverting natural drainage at suitable places. (3) Depth for digging foundations for retaining walls. (4) Collection of sufficient quantity of metal. Quantity of metal required to spread over definite areas of road surface should be calculated, definite places where they are to be stacked should be pegged on the road itself and the contractor made to stack just so much material at each place as would be required to spread over a definite area. (5) The width of the road and the gradient to be allowed at hair-pin curves.

It should be the object of the Range Officer not to stop any conveniences which the people close by have been enjoying such as water supply.

It should be the chief aim of the Range Officer to get work done through contractors without making advances. By making advances, one will feel tempted to accept bad work to adjust the advance, and thus become answerable for bad execution. It is possible to get work done without making advances and the custom, where it exists, should be gradually stopped.

The construction of the particular road has to be done very carefully, closely following the original alignment, as it is being constructed on a narrow strip of acquired land.

Close supervision with considerable apprehensions as to the contractor's aspirations is of primary importance.

* * * * *

Owing to want of profitable means of extraction of Eucalyptus globulus from distant reserves, the areas have been allowed to grow into high forest. By removing a definite volume of wood, by thinning, from each compartment, charcoal is manufactured in the reserve and taken for sale. This is more profitable than extracting fuel. The Senior Division marked trees to be felled in compartment II of the Newman Reserve. This removal frees trees of the future.

* * * * *

To obtain data for the rate of growth of Eucalyptus trees, certain trees (40 in number), marked in the Coonoor Peak Reserve for periodical measurements, have been measured and their heights and girths recorded.

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Badminton was played in camps and foot-ball at head quarters. There were no matches played during the quarter.

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Gymnastics is being practised by the Senior Division Students in which they will have an examination. Mr. C. E. C. Fischer has very kindly presented a Challenge

Cup for gymnastics to be held by the champion in the Senior Division.

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The Final Examination of the Senior Division and the second periodical examination for the Junior Division commence on the 12th June. This is a period of hard preparation.

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We acknowledge with thanks receipt of the Quarterly Journal of the Mysore Forest Association. We wish all success to the Journal.

An American Appreciation of the French Forest Service.

(Translated from the Revue des Eaux et Forets).

The fixation of the Dunes in the Landes and in Gironde by seedlings of Pinus maritima, the different methods of harvesting resin, the correction of torrents and reafforestation in the Alps and the Pyrannees, the Exploitation of Cork Oak, and the organisation of Fire Protection in Algeria, are problems that have been solved by French Foresters in a manner that merits our admiration.

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Speaking generally, French Methods of Forestry appear to the observer to be superior to those adopted in German practice.

The reason why American Foresters will find in France rather than in Germany the more profitable instruction and the more useful demonstrations is that French methods are less rigid, more supple, and less immutably fixed by cast-iron rules. French Forestry is the expression of the vivid and practical intelligence of the French Nation, and this is

specially true with reference to its application in the French Colonies where are largely to be found conditions similar to those that the Americans have to deal with.

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In Algeria the simplicity, economy, and efficiency of the Forest Administration has a special interest for us (Americans). Similarly the report of the Commission of Forest Researches, which recognises the maintenance of cover as of vital importance, merely echoes the view of every American Forester towards his National Forests, blessed as they are with that undergrowth so beneficial for preserving the water supply in California.

It is particularly in countries where Forestry is not intensively organised that Foresters will find matters of special application to America. A Forest Administrator will find more of direct interest in the North of Africa and in Corsica than in France and more in France than in Germany. The reason is that methods of intensive sylviculture have been systematically regulated in France for more than a century and important changes are now seldom necessary. In the North of Africa, on the other hand, local conditions, transport difficulties, and the low price of produce compel the abandonment of many of the sylvicultural principles accepted in France; and the modifications involved are of special interest.

Tunis.

There is much to learn in Tunis with reference to the administrative principles of Decentralised Organisation, Improvement Operations, Reafforestation, Protection against sand, wind, and climate, Fire-Protection [and particularly Fire-Lines], and Modifications in prescribed fellings necessitated by lack of Transport.

In Tunis two types of Management prevail, the one intensive for Cork-oak Forests capable of yielding a high return, the other more economical for Forests of Aleppo Pine which are only of value as a protection against erosion and dunes, or as a means of increasing the supply of fire-wood to the local population.

The system of management is not over-burdened with detail. On the contrary it is characterised by simplicity and is concerned rather with the fundamental principles than with the minutiæ of Forestry. As a consequence, the expenditure on Fire Protection is much higher in the Cork Oak Forests than in those of less value.

The protection of the Oases of Djerid has a particular interest for Americans, for the theory and practice of these operations are of direct application to the United States. These Oases form irrigated Private Lands, of great value, and have to be protected against moving sands, erosion, and excessive grazing.

By reason of the habits of the indigenous population the rules regulating the use of fire in or near the Forests are very strict, but it is admitted by the Administration that the settlements in the interior of the Forests are of special value as a protection against fire, for these cultivated lands form admirable fire lines. Further the settlers inside the Forests can be drawn on when it comes to fighting a fire. Grazing is forbidden on burnt areas for six years after the fire.

Each side of a Railway must be grubbed up and cleared of all inflammable material, and if necessary fire lines parallel to the line must be cut. In certain forests, which are reserved, no exploitation may be undertaken, with the exception of wood necessary for works against erosion or for the fixing of moving sands.

The regulation of pasturage, although of great interest, is much less developed than in the United States.

Simplicity is the chief characteristic of exploitation of the Cork Oak Forests. The Forester might almost be cultivating the valuable crops of fruit trees yielding periodically. The annual fellings are fairly equal in extent and cover each year the same area, but a forest is stripped only once every three years.

The most important lesson furnished by the study of Forestry in an arid and dry region is the difficulty of re-afforestation after the original forest has been destroyed, and this principle is applicable with equal force to the South West portions of the United States.

The trouble is enhanced when the dry period lasts through the summer months, as it is at that season that vegetation is less capable of resisting a deficiency in humidity than in the cold weather.

The methods of reafforestation employed are of direct application to the South of California, where the periodicity of winter rain corresponds exactly to that of Tunis.

In the more suitable spots the method of direct sowing in holes is adopted. In less favoured situations recourse is had to plantations in spite of the greater expense. To reduce the latter it is officially prescribed that the espacement should be from 6 to 8 feet, but in practice there are rarely more than 250 plants per acre.

The invariable rule is to sow or plant at the beginning of, and during, the winter rains. Up to the present reafforestation in Tunis has come on so little that it can only be regarded as an experiment, although what has been actually accomplished since 1885 is considerable in view of the small allotment made. The administration is essentially simple,

economical, and practical. Expenditure is dependent on the revenue rather than on the requirements of the situation.

Algeria.

The essential features of Forest Administration in Algeria are:—the unfortunate sale of State Forests of Cork Oak by Napoleon: the difficulty of preventing offences and theft: fire-protection (not of equal success everywhere): reafforestation: the Algerian Forest Act.

The progress accomplished by Algerian Forestry since 1900 is mainly due to the Forest Commission. The latter made a thorough study of the question, and suggested radical improvements in the methods of the Administration and in the Laws.

It is very significant that this Commission has recognised the importance of the Conservation of the existing Forests for the health, prosperity, and the amenities of Algeria. The difficulties met within the beginning are only characteristic of every commencement of Forest Administration the presence in the interior of the forests of useless and harmful cultivated lands: lack of comprehension in the forest questions: defects of local education as regards the benefits of forest conservation: the rigour of the original Forest Law which could not be put into practice and which in many cases was ill-adapted to a really effective administration. An Administrative Organisation ought to be practical rather than theoretical. This is clearly shown by the abandonment in Algiers of the classical organisation in force in France. This organisation has been found too onerous, and at the same time incapable of providing posts suitable for officers not of high rank but too senior however to be employed solely on such simple work as is involved in the extensive exploitation of the forest. Consequently the Conservator had to undertake the actual direction of

Rangers or little sub-divisions which correspond exactly to the units worked in the United States by a Forest Supervisor.

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It is interesting to note that by way of compensation for the trying life the Algerian Forest Service, Gazetted and Nongazetted Officers, receive extra pay, free travelling passes and grants for the education of children. An Officer has the right to 30 days leave per year which can be accumulated to two months every two years. He also has the right to a free passage for himself and his family between Algeria and France. The subordinates are frequently stationed far from towns and must place their children where schooling is available, but the Forest Department defrays these additional expenses of education.

The Administration is undoubtedly progressive. The development of a new industry such as the resin tapping of the Aleppo Pine in the forest of the Province of Oran is worthy of the American spirit of progress. The treatment applied to these forests seem to be practical and at the same time sufficiently conservative to ensure regeneration.

Another difference between the methods in France and those in Algeria concerns the sale of the Cork. In the French practice the Cork is sold "standing" after survey and hammer marking. The exploitation is entirely at the expense and risk of the purchaser who is subject also to the prescriptions of the Working Plans. In the Cork Forests of Algeria the Exploitation of the Cork is undertaken by the State and the Cork is only put on the market after it has been transported to the depots.

The Forest problems are similar to those that present themselves in Tunis. It is considered more advantageous to preserve the Forest from destruction rather than to have recourse to reafforestation.

Winter sowings or plantings from a commencement of the rains are the general rule.

Sowing generally made in holes carefully prepared are preferred to planting, but the conditions are so unfavourable that success is always uncertain. Local nurseries are employed in preference to central nurseries, as the latter involve troublesome and dangerous transportation of the plants. When reafforestation under difficult conditions has to be undertaken planting with balls of earth is frequently employed in spite of the increased expense.

Contrary to expectations planting on land covered with undergrowth succeeds less well if a portion of the undergrowth is preserved for protection against the sun and wind. Success will only be assured with complete uprooting of the surface to be planted; otherwise the intense radiation, extreme heat, lack of circulation of the air, very serious damage by rodents, prevent the greater part of plants from striking root.

The only expedient for lessening the damage by rodents is to entirely clear and clean up the whole area to be planted instead of being contented with uprooting merely planting holes or strips. With a complete clearing the rodents have nowhere to hide, consequently they nearly all quit the vicinity and the damage is reduced. Moreover I have myself remarked that the young Cork-Oak plants which are very delicate in their youth, particularly at the end of the summer, resist the heat better if they are uncovered than if they have to push themselves up from the midst of the thicket. I think that this phenomenon is due to the coolness caused by the aeration. The air circulates better and the plants are thus able to persist, where otherwise they would perish from the heat.

These methods of reafforestation should be studied by all foresters who have to work in arid or difficult situations. Important plantations have been made at Constantine, Algiers, Orleansville, and Oran. The local species give the best results whether by direct sowings in holes or in local nurseries. Success has been obtained only after repetition often repeated in the portions where there were originally failures.

As regards the efficacy of fire lines, the recruitment of patrols, the obligatory co-operation of local authorities, the enforcing of precautionary measures during the most dangerous season, these measures of protection have not had the same success everywhere. A network of Fire lines, principal and secondary, has been recently put down at considerable expense; but in spite of clearing these fire lines every three years fire crosses them. It seems that instead of clearing these fire lines every three years it would be preferable to clean every year one third of the width of all the lines (excepting those which are less than 45 feet wide which should be cleaned every three years) so that a part of the fire line is always free from grass and debris. For permanent lines it is recognised that, as a financial undertaking, it is more economical to uproot the undergrowth and the trees and to extract the roots instead of having each year the additional expense of cutting the shoots and the young growth. In conclusion fire lines of suitable width established on the crest or along the dry water courses are of undoubted value, both as a means of communication and as an advantageous position to arrest and fight the fire, in spite of the disastrous effects of any fire coming up from behind.

As in Tunis the administration is simple, economical, and productive of much good, and does honour to France.

Corsica.

Forest Administration in Corsica is hampered by a troublesome population, by excessive grazing, by fires, and until lately by the lack of means of communication.

If it were not for the difficulty of getting at the Corsican Pine which grows at an elevation superior to that of Maritime Pine but inferior to that of the Beech and the Silver Fir, there would be little forest wealth on the island. The principal lesson to be drawn from a forest tour in Corsica is the method of exploitation of the Pines. Originally the method of regeneration under shelterwood has resulted in young stocking of resinous trees of the same age over considerable areas. Certainly in theory such a practice is harmful in a region where fires are frequent, but theory is here subordinated to the practical necessity of large sales. Sales of great value for a long period ahead are necessary to attract purchasers able to undertake the expense of road construction. Considering the conditions necessary for the sales and also the danger of fire the Selection method by holes suitably enlarged appears to be an admirable solution of the problem of regeneration. There is much ingenuity in the application of this Selection method. There are seedlings, secondary and final fellings cleanings and thinnings as in the Uniform Method, but each operation occupies only an acre or two and the result is a forest of even-aged groups.

The danger of excessive exploitation combined with an insufficient suppression during the years clearly appears in many of the Corsican Forests where rigid and unhealthy young growth appears. In many of the contracts the conditions are similar to those prescribed by the United States Forest Service. There is however one capital difference. In Corsica the sale of coupes of great value to be realised for several years ahead is justified by the

resulting improvements in the means of communication. The sale of such coupes is regarded as an undoubted disability but necessary so that the transport of the produce of the small coupes may be rendered possible by the construction of forest roads. In the United States the development of steam transport is often harmful to the construction of a main line by the Concessionnaires. But an effort is now being made to use the running sales to contribute to the construction of a permanent Railway system. In Corsica the administration appears to have failed in the education of the indigenous population as regards the importance of the Forest Conservation. It seems incredible that of more than 600 offences charged in 1911, over half were acquitted. It is solely to the insufficiency of punishment that the retrogression of Corsican Forest must be attributed. The Magistracy has an inconceivable weakness for the shepherd, the true master of the Island, and the fines are not often recovered. Whence follow impunity and the aggravation of the evil. The rapid retrogression of the forest takes place for similar reasons in Algeria. This failure of supervision in the control and suppression of offences in Corsica makes a striking contract with the results obtained by the Forest Department in the west of the United States where now happily offences are merely a remembrance of the past.

The people must be educated and convinced of the utility of Forest Laws if such a situation is to be improved. But no education can be made without some effort at restraint and feebleness in suppression but contributes to the maintenance of such a deplorable state of affairs.

The Uniform Method in India.

Having vivid recollections of the difficulties experienced whilst an Instructor at Coimbatore, in explaining

the above method to students, without any opportunity of showing them its practical working, the writer thinks that a few notes on the method as seen during a tour in the Kulu division of the Panjab may be of interest both to past and present students.

The species to which the following remarks refer are Deodar, Blue pine (Pinus excelsa) and Spruce fir, all of them Himalayan confers.

The forests are situated on slopes not dissimilar to— those to be seen from the Nilgiri railway below Coonoor at an altitude of about 6000 to 8000 feet above the sea.

The areas treated under the Uniform method are by no means in a compact block, but are scattered over various forests, most of which are "Protected" and not "Reserved." The forests are burdened with numerous rights and are subject to heavy grazing, notably by sheep and goats, but providentially, under the settlement rules, approximately ¼ of the area may be completely closed, provided that ¾ of the area is left open to right holders.

For purposes of working, the area has been divided in to 4 Periodic Blocks, the length of a regeneration period has been fixed at 30 years and the rotation is 120 years. Should experience show that 25 years are sufficient for the regeneration of a periodic block and should it be found that the financial rotation is somewhat less than 120 years, it will always be possible, at a subsequent revision of the working plan to reduce the length of a period to, say 25 years and the rotation to 100 years.

The whole area has further been divided into compartments. Wherever possible from the nature of the growth, the size of the forest and the position of villages, the individual forests have been divided into 4 compartments

with natural boundaries, one compartment being allotted to each periodic block. Naturally this has not been possible in every forest, but being simple to understand, it is taken as a typical case.

Those compartments which contain growth, that is, for the most part mature, have been allotted to periodic block I, and they form, of course, approximately ¼ of the whole area.

The yield is regulated entirely by volume. Yield tables, showing the volume of trees of different diameters, have been compiled from thousands of trees felled during the last 20 years.

The entire stock of trees over 1 foot in diameter in P. B. I has been enumerated and the volume calculated from the yield tables. To this has been added the increment for half the number of years in the 1st period It will thus be seen that 1/30 part of the total volume so arrived at forms the annual yield for the 1st period, trees below 1 foot in diameter not being taken into account.

The steps to be taken for the practical working of the method are as follows:—

The areas in P. B. I of each forest are closed to grazing and wherever necessary they are fenced, since the keeping out of grazing animals is absolutely essential.

The D. F. O. uses his discretion in taking in hand any compartment or part of a compartment in P. B. I in different forests all over the division for regeneration. A seeding felling is carried out, care being taken to leave mother trees so espaced that a mixed crop may be expected to result. Preparatory fellings, as such, are not prescribed.

The year after the seeding felling, all felling dèbris, such as chips and branch-wood is collected into heaps and burnt at a cost of about Rs. 3 per acre. This operation is very necessary here and would no doubt be most beneficial in some of our Madras forests. If a good seed year follows the amount of regeneration that is obtained is very great but inevitably nature has to be assisted. Artificial broadcast sowing is effected on the burnt patches and from the resulting seedlings any which are not required on the patches are used to plant up blanks.

Weeding, at least twice a year during several subsequent rains, is another essential and must continue till the regeneration is fully established. By degrees more light is given by carrying out one or more secondary fellings, until after a varying number of years, it is possible to complete a final felling.

The writer has recently had the opportunity of seeing areas in which all the above mentioned operations have been carried out.

The working plan, described so briefly above, is the first of its kind in India to prescribe the uniform method for deodar, blue pine and fir forests and it is not yet fully completed. The fact that the results of treatment by a regular method can already be seen is due to experimental work which the Working Plans Officer, who has been D. F. O. in Kulu for a number of years, has been carrying out for sometime past. Until quite recently the Kulu forests have been worked under the so called Selection Method, on the same sort of lines as those prescribed for so many High Forests in India.

Under the new system of concentrated working a Ranger will hold charge of about 25,000 acres of actual forest and the success or failure of the method will depend

very largely indeed on the amount of active interest and care taken by the Ranger and his subordinates, as artificial help to the regeneration must be given and its constant tending until it is fully established, must be carried out in due season, without individual orders being given by the D. F. O. on each case.

Camp Kulu,
7—5—18.

A. W.

Fire Lines.

The interesting article in the March number of the Magazine opens up a wide field for discussion and it is to be hoped that Rangers with experience in different parts of the Presidency will send in details of their experience and their opinions and suggestions. There is an old English proverb to the effect that "what is sauce for the goose is sauce for the gander", but however true this may be when the geese and the ganders are all in the same field, it is absolutely false in the case of fire protection carried out under the varying conditions of forest and climate which have to be dealt with in the Madras Presidency. A more appropriate proverb would be "one man's meat is another man's poison" for protective measures which might be suitable in the dry forests of the Cuddapah district would possibly be fatal in the damp forests of the west coast. It is therefore useless to expect a general concurrence of opinion regarding the most suitable measures to be adopted, the width of firelines, the date by which firetracing should be completed, the number of patrols required, and so on. On general principles certain axioms can be laid down; fire lines must be just broad enough to stop a fire getting across; but how is the width to be determined? As a rule of thumb it may be laid down that the width of a fire line should be eight times the height of the grass, but local conditions

frequently necessitate modifications of any such rule. One line may be in a sheltered valley running through dense forest, while another line may run over bare wind-swept hill slopes and though the height of the grass may be the same in both cases it would evidently be a waste of forest to burn a line through the sheltered forest of the width necessary on the wind-swept slopes, and a waste of time and money to burn a line on the wind-swept slopes of the width which would suffice for the sheltered forest. Another axiom is that the guide lines must be cleared before the grass is dry enough to burn, but in some places it is impossible to get labour until the field crops are harvested by which time the grass is overdry, while in other places the grass on the fire-lines is so short that no guide line clearing is required. The writer remembers one case in which the chief expense of fire-tracing was the cost of cutting grass in the adjoining forest, carrying it and spreading it on the fire-line which was so bare of grass that no burn could be effected without the addition of dry grass. It may be argued that fire-tracing such a line was unnecessary, but many officers must have experience of similar lines which though almost devoid of grass still contain enough short growth to enable a fire to creep across the line.

The question of the relative advantages of *open* and *closed* lines must also depend on local conditions. Undoubtedly on open lines the grass dries earlier than on closed lines, but on the other hand in some forests opening the lines causes a dense growth of grass which is very difficult to deal with. In Malabar for instance the grass under forest growth is scanty and fairly short; broad open lines were cut through this forest with the result that a dense growth of grass and thorns up to ten feet in height sprang up, rendering fire-tracing a difficult, expensive and dangerous operation, and allowing thorny growth and

lantana to penetrate into areas hitherto immune from these pests.

A point for consideration is whether any improvements in the system of fire-protection are possible; experiments have been made in growing ever-green species on fire-lines; have these experiments succeeded? If not, why not? Are the results conclusive, or should further experiments be made in various classes of forests? On a portion of the Malabar—Mysore boundary the grass is kept short by heavy grazing and thereby the cost and danger of burning the lines are much reduced. Can similar action be taken elsewhere? On the other hand, in dry forests heavy grazing on the fire-lines so reduces the scanty growth of grass that there is not enough to burn freely and yet too much to leave unburnt. What remedies can be suggested? In another part of Malabar efforts were made to lease out the broad fire-lines for cultivation. What have been the results of these efforts? It may be possible to develop this idea by leasing out lengths of fire-lines for cultivation to fire-patrols, thus inducing them to live on the lines. It might be necessary to dig wells on some lines in order to encourage cultivation and in some places it might be possible to introduce wet cultivation which would make an ideal fire-line.

If the forests are worth protecting they are worth spending money on, and the Forest Department should not shy at incurring capital expenditure to ensure improved protection. In America fire protection is carried out on a much larger scale than anything in India; fire stations are connected by telephone, and permanent fire depots are maintained, in which stocks of tools etc., are kept ready for use. Fires are stopped by digging trenches along selected lines, and one method of digging such trenches is by means of a long string of dynamite cartridges connected by a quick

fuse; the string is laid along the line and then the fuse is lit; the dynamite blasts away the grass and humus and leaves a clear earth trench.

Now will some Rangers send in ideas? Enough has been said to show that there is ample room for new ideas as well as for discussing present methods and comparing their results in different classes of forests. Regarding present methods it may be remarked that what is common practice in Ganjam may be quite new to Canara, and the Magazine is an excellent medium for communicating to all districts details which at present are only known in a few.

F. A. L.

Our contributor has "touched the spot" in asking Rangers for *their* ideas. On Fire Protection, as on many other subjects, the opinion of the competent man who has to carry out the work should be of great practical value. We are all agreed that Fire Protection in India is still far from perfect, and the object of the Department naturally is to evolve the best practical means of realising a possible ideal. The present generation perhaps will hardly see in India the standards attained in America (where Aeroplanes are utilised for transporting officers to the scene of a Fire), or in the Portuguese Forest of Leira with its lofty Observation Stations furnished with degree-marked dials, heliographs, and flash-lights, and provided with stables of horses for mounted Fire-Patrols. But much may be done to render the Protection more efficient. Improvement in the amenities of life for the Fire-Patrols suggests itself. In France Forest Guards are given plots of land for cultivation. An attempt was made to introduce this system in one of the Kurnool Divisions, but the frequency of transfers defeated the project. The same difficulty would perhaps be less serious in the case of Fire Patrols who are

employed year after year in the same locality. However—*what do the Rangers think?*

Editor.

Fire Protection in the Nallamalais.

It is now fully realized by the Forest Officers that provisions are to be invariably made in Working Plans for the successful regeneration of a forest. A Forest Ranger may get himself acquainted in a short time with the needs of the forest entrusted to his care and may successfully apply the methods for its improvement. But he finds it all futile when he finds that his forest is all of a sudden swept over by a fire and leaves him a dark patch with bare trees, all charred to the top standing apart from each other and through the intervening spaces of which his eye penetrates miles afar. He feels as if nature students out and laughs at him and at his hopes. In the deciduous forests like Nallamalais, where grass grows over to a height of more than 9 or 10 feet, fire is the chief danger.

In spite of the well thought-out fire lines and the care taken by the officers, fire has become a common occurrence in those forests, so much so that the Rangers start on the assumption that their forest is impossible to be protected from fire and very often leaves it to chance or fate as the Hindoo puts it. Fire watchers, as their name implies, are sent to watch and to let them know if there is any fire. By the time the Ranger collects his men and some of the reluctant villagers and proceeds to the scene of fire, the fire spreads and presents a large front. He then thinks that the job is like chasing the wild goose and begins to 'counter-fire' it and thus completes the destruction in a shorter time. A day or two after, the fire starts in another part of his range and

the same tale of yesterday is told and he goes home awfully disgusted at the Fire-god and in his private room resolves and re-resolves that he should not allow the same thing to happen next year.

Some less zealous Rangers, as soon as fire breaks out in their range, indulge in sending memos after memos to their subordinates and try to put it out from their quarters through these orders. This has a double disadvantage. The Dy. Rangers are generally inexperienced in tackling with the problem and are at a loss to know what to do. Secondly, the irresponsible subordinates, finding that the Ranger is not interested in the work, do not make a real attempt to put it out. The Ranger has then to blindly rely upon the reports given to him by the subordinates and reports in his turn that the fire was uncontrollable. The Range officer must invariably be present on the scene of fire and satisfy himself that the fire is really ravenous and unquenchable. Otherwise he is not worth the salt which he is eating.

Much trouble is saved if the Ranger takes the pains of finding out the chief causes of fire in his Range. If it is an "act of God" such as lightning or friction, he cannot of course help it. But these are extremely rare and "God's in His heaven." Almost all the fires are caused through the act of man. I may mention one or two. Most of the villagers round these hills want grass and it is cut during the fire season for then they have leisure. They go about the forests in groups and "without their ken" the spot is set on fire. They are panic-stricken, though not so much from the fire but from the idea that they would be arrested by the more fiery man (the forest subordinates) and endeavour to escape from that place. This trouble can to a great extent be minimised by the head of the gang in charge of the beat if he tries

to arrange with the villagers that they must cut grass in a certain area for a day or two and then to go to another place. He can send one of his watchers to that area to see that no fire occurs in that locality.

The bamboo coolies are also greatly responsible for the fires in the Nallamalais. These men do not generally observe the rules laid down in the contract agreements that they should lit fire only in certain places, called "pentas" approved by the District Forest Officer. Much danger from fire can be reduced if the subordinates enforce these rules.

The Chenchus, the forest tribes on these hills, who are not such hononrable men as the Khonds of Ganjam, are partially responsible for the fires. They burn the forest if they have a spite against the officer in charge of them. They are awarded rewards if the forest is protected from fire. Some of them are taken as fire watchers during the fire season. But this is not sufficient. Some of them must be taken as permanent watchers in the hill beats and they must be told that they are responsible if any fire or theft occurs in their beat. A permanent appointment of this nature in the department pleases their little minds and they will do good work as long as they are honestly dealt with. I do not know if this is feasible financially but it will be beneficial in the long run.

Another cause which some Rangers put forth and which almost amounts to the ludicrous is that the fire crossed into their divisions from the adjoining Ranges. This has been well met by the authorities by an order, as ingenious as the latter is silly that the boundary lines after they are completely burnt and cleared, must be inspected by the two Range officers together and reported that it is in good condition.

Most of the fire lines in the Nallamalais are from 60 to 100 feet wide. This width is essential on account of the presence of bamboos which when they take fire, burst with great violence and instances are known of the burning cinders being carried over 200′. A 100 feet wide line should be quite safe. The spreading of fire when once it is set on foot, is chiefly due to the fire lines not being completely burnt. The fire like every other form of energy, seems to have a tendency to take the line of least resistance and passes along thin strips of grass if they happen to be sufficiently dry to burn. In one part of the Nallamalais the operation of burning the fire lines is as follows :—

The fire season begins by 1st February. The clearing of lines is started as early as October 15th and the fire tracing is done during the latter half of December. The lines are generally 60' wide. Guide lines of 15' wide on both sides of the fire line are completely cleared of all growth and the debris spread on the middle part. The regrowth on the 30 feet left in the middle is cut and the grass on it is beaten down with bamboos. The cost of this operation including the subsequent fire tracing comes to 8 to 10 Rs. per mile. In some other places the whole line is cleared of the regrowth and grass and this operation including the firing amounts to Rs. 15 per mile. Both these are successful and the former is cheaper. The rates given are for the lines in which the grass is 6 feet high. As for the medium and low grass the rates are Rs. 12 and 10 per mile respectively for the latter operation. Medium grass is 3 feet high and the low grass is 1½ feet.

The fire patrols are appointed during the fire season i. e. after the fire line operations are supposed to be over. In cases where single fire tracing is not sufficient thus necessitating subsequent burnings which are expensive,

these patrols assisted by some of the beat watchers may be asked to go along the line reburning the patches unburnt and if the grass is not sufficiently dry, it can be cut and thrown outside the line in the Reserve. If they thus go along the line twice or thrice, the line will then be clear.

I have heard often exclaimed by the Rangers "Let the hill Forests go, let us take care of the plains". They may be justified in so far as it is impossible to quench a fire on hill slopes. But it is particularly desirable that the places liable to erosion should be rigidly protected from fire. Erosion not only affects the growth on the hills but also has an evil influence on the vegetation down on the plains. As an example we may cite the Hyderabad State. There the protection was loose and the grievous mistake is realized now that the agricultural crops have begun to suffer to an appreciable extent. Fire lines ought to prevent fires on these hills or at least localise them. We shall consider what action is to be taken when the hill slopes are on fire. This is a question which baffles many and we most gladly welcome practical suggestions on this important point. It is almost impossible to face the fire and beat it down on the side of steep hills for one easily looses his balance on them especially if there are boulders. *The Range Officer must prepare a plan for each block or beat showing therein all the roads, foot-paths and tracks of cattle so that these may be used as clearing lines or base lines* for counterfiring when a conflagration arises. If such paths are not close at hand, a temporary line say 3 feet wide may be cut in a line parallel to the fire as a base line for counterfiring. The supervising officer must have his wits about him and come to a quick decision. One of the dangers in such counterfires especially when the path has sharp curves, is that some men get caught in the fire.

Fire, when going up a hill, has a rapid pace and if a man goes to the other side of the path by mistake, he finds himself surrounded by fire. The impending danger easily upsets him if the supervising officer is weak and slow to realize his condition.

M. Umapathi,
Assistant Editor.

The Khonds and the hill-forests of Ganjam.

Some of the aboriginal tribes of India are the Bhils in Rajputana, Santals in Bengal, and the Khonds, the Koyas, the Chenchus and the Todas of Madras. The hill tribes living on the hills of Ganjam are known as the Khonds.

They are mainly pastoral in their habits, although the proper use of the country guns, bows and arrows, and of trained dogs are not unknown to them. They live in small thatched huts on the hills and on the outskirts of the plains, a few huts constituting what is known as a "khonds gam" meaning in Uriya a khond village. The inmates of a khond hut are generally his old parents, his wife and a few malaria striken pot-bellied children. Each village has got a khond head known as the "moliks" and for two or more "gams" there is a common head called a "Podra." The moliks generally an aged man has got some influence in the village and in minor family and social quarrels his advice is followed; but in grave social and religious matters concerning the community as a whole the "Podras" have got full powers, and even in criminal matters—but there is nothing very criminal with them so long as the offender stands a treat to the affected party and the other villagers—no complaint is ever carried to an outsider and they do not seek the Police or a Magistrate to intervene.

The wants of khonds are very few. On the outskirts of the plains, his dress will ordinarily consist of a narrow piece of cloth tied round his waist, and he wears no head gear generally, but replaces it with a "Talari" a kind of umbrella prepared in the form of a large hat or a rotate flower. It consists of a frame work of thin split bamboos woven nicely in two layers to hold in position the leaves of Bauhinia Vahlii or sal placed between them, the two layers of framework being then tied together with Bauhinia fibre. The umbrella has also got a thin string made of the same fibre corresponding to the chin strap of a hat and serving a similar purpose. This protects his head from the sun and rain and is a special wear common among the Uriyas and Khonds of the district. The one advantage of this kind of an umbrella is that it can be had on the head even when working in fields with both hands. He neither crops his head nor shaves it. He combs his head neatly and ties his hair up and adorns it with the same comb, a few porcupine needles, and his favourite "Khali" (a green sal leaf twisted into a pipe) when he does not want it for smoking. A glittering "tangi" (a battle axe) or a small ordinary axe, invariably in his hand completes his accoutrements; but a "mali" (necklace) made of reeds, round his neck and occasionally a bangle or a pair, made of brass, nickel or rarely silver, round his wrists and a few rings in his fingers should not be ignored when you think of jewellery. His better half is rather better than he, so far as her dress is concerned. She wears a bigger cloth covering also the upper part of her body but wears no petty coat. She dresses her hair equally well. Her necklace consists of as many strings of beads as she could procure, and whenever she waves her hands you will hear the clinking sound of her bangles, some made of inferior metals such as brass, nickel and some of lac. One of the interesting features about her person is the extensive tattooing which does not fail to

attract the attention of even a casual observer, and on her forehead, cheeks, chin, forearms, and on the back of her hand the tattoo marks shew up fantastically in different forms such as creepers, leaves, buds, flowers, human forms and what not. There is no face of a khond woman without a tattoo mark on it. This is the description of the dress of a khond pair living on the outskirts of the plains in the Gumsoor Taluk, Ganjam District. In this case, the khond comes in contact with the plains-men and is considered to be a bit civilized. In the far interior of the Agency Tracts the khond does not perhaps want to hide the beauties of nature with artificial covering such as clothes etc., and for that reason he is said to be almost sky-clad. I heard from a friend that the male there simply wears a narrow strip of cloth, while the female covers the middle of her body with a few broad leaves, leaving the other parts of her body quite exposed. This is one of the remote corners of the world, outside the pale of civilization. The khond there is naturally brought up to this and he finds no necessity for an invention of a new thing.

His meal is very simple. He can practically live upon whatever he can get to eat—vegetables, non-vegetables, roots, leaves, flowers, fruits, gums, flesh; even earth and sometimes fasting too for a day or two. His domestic animals are a few bulls necessary for cultivation, cows, dogs, pigs and fowls, and it is very rare that he keeps a small country pony. Round about the village and on the hill slopes he carries on "Podu" cultivation (which will be explained later on) and grows cereal crops such as dholl, big dholl, grams, dolichos and maize etc. The cultivation here is entirely dependant on the rains and the khond never tends his crop and is quite satisfied with whatever Providence can furnish him through the monsoons. But Providence has to look after the welfare of other objects of creation also and so

it will not be fair on the part of the khond living in the forest to harvest in full what Providence intended for all the beings in the forest, of which he is one. There are the deer, the pig and the elephant to share the produce with him. It is therefore necessary that he should be prepared for the worst that may happen when he thinks of the mottoes 'Might is right" or the "Early Bird catches the worm." He therefore tries to make the best use of whatever articles of food he may at any time procure. Most of the things that, under the circumstances, form his diet are very hard to digest and some of them he takes quite raw also, as for instance roots, flowers and fruits, and this is an advantage to him in one way, i.e., he does not require large quantities to eat, if raw. In summer he collects mohwa (*Bassia latifolia*) flowers and different kinds of fruits such as the mangoes, tamarind, Jack, Diospyros, Phœnix, Buchanania and seeds of mango, tamarind, Bauhinia, and bamboos if available; and in the rains you will see the whole family engaged in digging up different kinds of roots. The mohwa flower is dried in the sun and is then eaten either raw or fried. This is very hard to digest and heats the system very much. It is to be taken only in small quantities at a time, otherwise there may be serious trouble on account of excessive thirst. Some of us cannot even bear the smell of the flowers, so much so, that we cannot stand under the tree, while in full blossom. The mango seed is the next thing. In the first place it is very difficult to prepare it for cooking. The seed is smashed well with a stone and washed over and over again in a running stream to get rid of its sour taste. It is then boiled with some salt and eaten. This is one of the peculiar diets of the khonds and I think it is eaten nowhere else. Of course the fruits of Phœnix and Diospyros also are not very nice articles of food; they constipate and create stomach-ache very easily. The seeds of tamarind and

Bauhinia Vahlii are roasted and eaten and neither of these possess any good quality as food. But in the case of some of the roots and fruits some of the readers may surely envy the khond's position; they are very delicious. It is only very rarely that he gets the bamboo seeds.

The khond can have also his drink in the forest. He distils arrack from mohwa flowers occasionally, but usually extracts toddy ("Solop mohwa") from Caryota urens. Compared with the Chenchus on the Nallamalais, Kurnool District, the khond is very temperate in his habits and less atrocious in his actions. The former indulges too much in drinking mohwa arrack and is not available for work for two or three days each time he enjoys it; with the bows and arrows in his hand, a weapon more or less a part of him, and which he does not dare to part with even a single moment, especially when he is a criminal offender, the Chenchu is often quite unapproachable even by men nearest and dearest to him. In his drunkenness the Chenchu is much dreaded and very often commits murders and highway robberies.

The khond is not generally very sportive but he sometimes sets out with his dogs, axe in hand. If he wants to make use of his country gun he cannot be moving about in the forest but has only to wait on a "machan" which will be more often on his own field. A deer, sambhur, or a greedy pig will generally commemorate the day. With a khond, the bows and arrows are quite secondary which shows his idleness.

Even in such remote corners of the world, pleasant feelings are not wanting in the khonds. They take advantage of merry evenings and pleasant moonlight nights; a small group of grown up girls and bachelors is formed; they beat drums, sing and indulge in a kind of dancing

peculiar to themselves. The beat of drums and songs can be heard from the neighbouring places, and if one happens to camp in the neighbourhood on such a night he may have his sleep disturbed till very late in the night unless he is not likely to be so easily disturbed. They keep such late hours that either sleep interrupts or as a consequence of an over dose of drink the males falter. This is a prelude to marriage; they get engaged in course of time. The successful pair makes itself known by disappearing from the scene and eventually leaving the village altogether. The parents of the lovers then get them back and celebrate their marriage.

The above is rather a long description of the manners, customs and habits of the khonds; but it is necessary to shew the peculiar circumstances in which the khond is struggling for existence in the forest among many other objects of creation. He is very simple and has no cravings for luxuries. By his endurance and peculiar way of adapting himself to environments. he has at least proved himself to be quite fit to live in the forest under the most adverse circumstances. So much then about the khonds themselves, living in the hill forests, their natural home.

Turning now to the condition of forests in their hands. The chief point in which the khonds made themselves conspicuous in the eyes of the forester is the "Podu" cultivation of which reference was already made. Just before the outbreak of monsoons he selects a plot of ground on the hill slopes, cuts the growth thereon and burns the stuff wholesale. This gives him enough manure for raising the cereal crops such as dholl, grams &c. For 3 or 4 years he continues to cultivate this plot, whereupon the soil becomes too poor to support any good crop on it. He then abandons it and selects some other plot and treats it in the same way as he did the first, for another 3 or 4 years.

Meanwhile some coppice shoots and other growth might have come up in the first plot. If he thinks there is enough stuff for the supply of a good quantity of manure he takes up the plot again the second time, otherwise he goes and chooses a third plot in some other place and subjects it to a similar treatment. This kind of shifting cultivation is quite incompatible with the existence of forest crop, and the very idea is repugnant to a sylviculturist. The damages entailed by such cuttings and the wholesale burning, especially on a hill slope, are too well known to need any detailed description. The burning bakes the soil and impoverishes it by destroying the humus, and the cuttings expose it to further external injuries. Quick growing soft woods and bamboos occupy the cultivated patches, or erosion and gradual destruction of the hill forests may ensue, and the disappearance of the hill forests may seriously tell upon the plains in the long run. When the Forest Department originally wanted to protect these forests from the khond raids, the latter offered much resistance. They did not like the presence of the "Saibo" (a European officer and in this case the District Forest Officer) in their midst, nor did they want to hear his proposals putting a stop to the "Podu" cultivation they were so very fond of. They paid no heed to the instructions of the "Saibo," and his promises to grant them lands in the enclosures and give them facilities for cultivation were of no avail. They were not convinced. They were much enraged at the steps taken by the "Saibo" to demarcate the forests, and not only refused to supply labour but even went to such an extremity as to set fire to the whole forest with the determination of baffling the attempts of the Department, and knocked over the demarcation cairns and obliterated the boundary lines. This is what actually happened at the time the Pondakhal forests (Ganjam) were reserved. No doubt at the back of their

minds lurked the idea that the entry of Government Officers in their preserves would lead to the taxation of their lands.

The facts mentioned above do not place the khonds high in the opinion of the reader who will not for a moment think at the onset whether the khonds will be of any use to the Department or whether there was ever latent in them such spirit as to make them turn over a new leaf altogether. No doubt it is beyond an average man to bring the khonds of the above description closer together, nor can it be the work of a single day. The inference is not that the khonds are a very formidable people, but they are not to be convinced easily on any matter and made to deviate from the groove they were moving along for ages. But at last they had to yield to the stronger force of the Department. They gave up poduing the slopes of the hills and undertook to do the forest work. The Department also kept its word; in some cases presented them with ploughing bulls and buffaloes for the better cultivation of their enclosures, allowed free grazing of their cattle, provided them with congenial work in road-making, and took the further trouble of opening provision shops at convenient centres, and supplying them with the necessaries of life. They are paid in kind for the works they do in the forest, and a thoroughly new atmosphere is created around them. They eat well, dress better and live happily. This state of things refers particularly to the Pandakhal forests. The Deputy Rangers directly control their work and as far as possible they are free from contact with lower subordinates.

To speak of the khonds in relation to the forests generally. They are now true to the salt they eat from the hands of the Department. The steps taken by them to fire-protect the forests they were themselves once destroying by "Podu" cultivation is most commendable and seems to be a sincere atonement for their past actions. The credit of

drawing the khonds closer together and organising them under a more or less "Forest Village System" and of making it a thorough success is entirely due to the District Forest Officer who is now one of our Imperial Instructors in the College.

A short description of the system above referred to will explain to the reader the interest the khonds now take in fire-protection works and the reciprocal care by the Department in attending to their wants. The hill forests of Ganjam are for the most part surrounded by the Zemindari forests, and they are generally a source of great danger from fire. No steps are taken by the private owner to protect his forests from fires and as such the forests are seen burning for weeks. It was rather difficult to keep out tremendous fires from entering the Government forests when the frontier lines were not broad enough for the purpose, and the efforts of even the willing subordinates were sometimes unsuccessful. The frontier fire lines were thereupon widened to 60 feet, and the cost of fire tracing such lines was shared by both parties on either side of the line. The Forest Department recovers their share of the cost from the Zemindars and does the fire-tracing of the lines. In the beginning of the fire season the total length of the frontier and internal fire lines within the reach of the khond village is divided up into such short lengths as will be convenient for a group of two or three villages to do the work easily. The responsible Deputy Ranger, Forester or Forest Guard then takes the different groups of the villagers to their respective lines, and shows them the width of the guide lines to be cut and gives them full instructions as to how to get the lines ready for burning. Any one of the lower subordinates above referred to or a watcher will supervise the cutting though the khonds themselves usually do the work satisfactorily whether there is any supervision on their work or not. The

responsibility of fire-tracing the lines properly is never to be shoved on a watcher and so the Deputy Ranger, the Forester or the Guard invariably attends the burning of the lines. For the initial cutting and burning of the lines the khonds or rather the group of khond villages doing the work together at the same time are paid their wages calculated at so much per mile in a lump sum and the khonds divide the amount amongst themselves. Thereafter the khonds look after the lines themselves and are held responsible for keeping the lines scrupulously clean at all times during the fire season. They watch the fires in the Zemindari forests and never allow them to cross over to the Government forests. On the outbreak of fire in the Government forests, they send a messenger to the nearest forest subordinate and themselves set out to the scene of fire and extinguish it. In return for the successful fire-protection in a season the khonds get the following concessions from the Department

(1) Concession to remove small timber, bamboo and thatch grass for the construction and repairs of their huts, at so much per hut.

(2) Concession to remove the minor forest produce for their own use. (3) Concession to graze their cattle free. In addition they are allowed to collect kamala powder from the fruits of Mallotus philippinensis, and sell it to the Department. The villagers in whose village limits the trees occur have got the exclusive right of collection over the other villagers. Some of the khonds also stand a chance of being employed as fire watchers, for which they are paid separately at a fixed monthly rate as elsewhere.

The concessions and the conditions under which the khonds will be entitled to them are drawn out in a concession form in triplicate, one for the khond headman, one for the Range Officer and one for the District Forest Officer, and

signed by the District Forest Officer himself. At the commencement of the fire season these forms are sent to the Range Officer for distribution amongst the khonds. At the time of issuing these concessions the Range Officer personally explains to the khonds the nature of the concessions and the conditions to be fulfilled by them if they want to claim them, and also in the course of his tours inspects their work now and then and gives them the necessary instructions. At the end of the fire season the Range Officer submits his report on the relative merits of these villages and the success in fire-protection; and with the permission of the District Forest Officer permits the successful villagers to remove the quantity of timber, bamboos and thatch grass; the timber from the unreserves as far as possible—there are vast areas of unreserved forests in the district—some of the khonds are also warned for slackness of duty. The District Forest Officer in course of his tours in the Range visits the khond villages and satisfies himself whether the khonds are enjoying the concessions granted to them. Such is the relationship between the Forest Department and the khonds at the present day. They are responsive to kindness and are the most faithful of the hill-tribes I have seen.

The instance quoted above shows clearly how by careful administration and fair play, even the stubborn hill tribes may be trained in the forest works and organised under the "Forest village system" to the mutual benefit of both. The advantages of this system are many. In the interior of forests away from the villages, labour is always difficult to procure for fire-protection, road-making etc. works and the imported labour is not available throughout the year owing to many impediments such as malaria, demand in the plains for agricultural purposes etc. The employment of the same trained men year after year hastens progress in the works and lessens cost of supervision. The work will not suffer

for want of labour supply in any part of the year. In such localities where labour supply is not permanent and where the services of the hill tribes can be utilised at least at some sacrifice such as money reward, free grants of produce, free grazing etc. such organisation as above referred to will be a great boon to the Department. The employment of khonds for general protection of the forests has a wholesome effect on lower subordinates apt to stray from the paths of honesty and on theft and illicit grazing; for little goes on in the forests without the khond's knowledge and they realise it is part of their work to report the misdeeds of others to the District Forest Officer and the Range Officer. Other instances are not wanting to prove the possibility of such arrangement by a patient, tactful and sincere officer, as in the case of the Chenchus on the Nallamalais (Kurnool Dt.) and the Malayalis on the Javadis (S. Vellore).

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Hill-tribes and how to deal with them.

In the present stage of the devolopment of our forests, in many parts of the Presidency, hill-men are the chief source of labour for all forest works and this is especially so in places which are not easily accessible owing to want of communications and also where malaria is prevalent. In such places, all attempts to get labour from the plains generally meet with little success. Hence the forest officer is compelled to make the best of the hill-people and in this task he is brought face to face with many a problem difficult of solution. In what follows, a few practical hints gathered by the writer during his experience with more than one tribe of hill-men are given with the belief they may prove helpful to his colleagues.

Hill-men, as a rule, have few wants. The usually rich soiled hill-slopes with very little trouble taken in tilling weeding &c., yield all the produce necessary for their life. The majority of the rest of their wants are supplied by their cattle, which enjoy a free and unlimited grazing in many cases. As a result, they are lazy and shirk all hard work. Wages are not sufficiently tempting to make them work hard. This combined with the effects of the independent life they have led, such as rudeness, want of respect in the due degree to superiors and want of policy and obedience limits to a great extent the utility of hill-men, as a source of labour. Hence it is that a first officer to be successful should be bold, prudent and tactful in his dealings with hill-men. This implies a study of the hill-people themselves.

The first requisite is sympathy. The mind of the oriental is peculiarly susceptible to all marks of sympathy. Talking about topics of general interest, such as the shandy, the chief events of the place, such as a criminal or civil case &c , or of special interest, such as the availablity of fodder for cattle, places of good water, suitable sites for a camp &c. or enquiring about the general welfare of the individual, his status in the village, marriages contemplated or conducted in his family, &c. have a good effect in bringing the talker and the man or men talked to into closer relation. So it is important that a forest officer should cultivate such habits. He should not confine his sympathy to words but should extend it to deeds also. Occasions are not rare when he can by acts of his, impress the people very well by his sympathetic attitude. This principle has now been generally accepted by all forest officers and attempts at practising it are not wanting, especially with the younger set of Rangers. But a word of caution is necessary here. Examples are not wanting

of cases in which new men—especially Rangers through lack of caution have had many pit falls. The writer is aware of blunders committed in the name of sympathy. It is important to remember that familiarity breeds contempt and sometimes involves irremediable evils. Everything has a place and a limit and the unwise man may destroy what the wisdom of many has built. The more ignorant your people are the more prudent you require to be.

The next suggestion is—'Help the sick.' This is in fact another form of sympathy—but this requires special mention as this is a very important factor. The best time to gain a man is when he is sick. So the forest Officer, should undertake the roll of a medical man occasionally. The chief forms of sickness the hill-people in general are subject to are fever, wounds and boils or ulcers. Their treatment requires little medical skill. Many are the common medicines which can cure their maladies. The forest officer, should provide himself with them and administer them to the people as occasion requires it. By experience the writer has found this to be a very potent means of getting at the people. Even here caution is necessary. Too much of anything is good for nothing. We do not value things which we do not strive to get.

The third hint is—'Respect the man on the spot, or if it be you, respect yourself.' This means much and requires little explanation. First if you are not the man on the spot, with due limit respect the man on the spot. The Range officer is only an occasional visitor, and it is the officer on the spot who has much to do with the people. All utterances which tend to lower him in the eyes of the people should be avoided. Some, either out of ignorance or inexperience, fail to do this and thus cut

their own legs. For invariably it so happens, that the superior officer himself loses control, gets slighted, finds himself inefficient and consequently compelled to move to another sphere. Trust your man. He may not always be worthy of trust, but as long as he is there, you have to show that you trust him, though with all precaution. On the other hand, if you are the one on the spot respect yourself, watch your own behaviour. Shun all mean things; you will in a short time find that this is a great asset in gaining you control over the hill-men and in spreading your influence.

The fourth hint is 'Be slow to promise and quick to perform.' When coolies are got to do your work, your promise to pay their wages goes without saying. This promise should never be delayed in being fulfilled. Promptness in paying all wages is one of the surest means of getting men whenever you require them. This is so with people in the plains also. But this is more so with hill-men. Fail to clear off all arrears of wages once, the next time you go to get your coolies, none will be at home to you, though in reality they be at home. Serious troubles have, besides, resulted from irregularity in payments. In this, one thing has to be borne in mind. Hill-people are quick in spending what they get and are eager to get whatever they can, after work has been done. So habit of coming for wages, whenever they like or want and in case of failure to be paid, taking offence at it or pretending to do so, so as to make it an excuse for not going to do forest work is likely to be formed. The forester should be careful to avoid such mishaps and the best way to do this is to be regular and systematic as far as possible in his business. He should fix regular days for payment and see that he clears off all arrears on that day.

Many more are the points which will suggest themselves to an observant and studious mind; which can be made use of in getting a full control over hill-men, such as playing the part of an arbitrator occasionally, in village quarrels defending and freeing them from the worries of outsiders &c. But in the beginning, a forest officer, before he knows where he is and what he is about, should proceed cautiously lest he should commit irreparable blunders, for, as above said, what it takes many to build, one can shatter to pieces.

T. D. Ponniah,
Junior Student.

The First Elephant Capture in the Bolampatti Valley.

Both the Divisions of the Madras Forest College arrived at the Sadivayal Camp on the 4th February last and were greeted with the news of the fall of a tusker in a pit about 4 miles from the camp. Elephant capturing operation had been newly started in the Bolampatti Valley and there was considerable speculation as to how far they would be successful. Many of us were rather pessimistic when we learnt that the "Kumki" elephants were not at the spot and had to be wired for and brought all the way from Mount Stuart. We were further told that this was the second fall, the first having escaped from the pit while waiting for the "Kumkies." Some of the more outspoken among us freely criticised this arrangement of having to wait long for the Kumki elephants. It is indeed a serious and responsible task to keep a fall in the pit for considerable length of time. The chief interest of this capture centres round the manner in which the wild tusker was kept in health for a week in the pit. He was about 7 feet high and was in the pink of condition when he fell into the pit. He was young and

handsome with long symmetrical tusks. He was in every way a desirable capture. Much credit is due to the Range Officer and his assistants for keeping this powerful animal safely for a week in the pit till the decoys arrived, quite new as they were to the work. The walls of the pit were soft and the onslaught of the tusker on them with his powerful tusks soon began to fill it up with earth. As the pit became filled up the difficulty of keeping in the animal became more and more difficult. Logs were thrown across to prevent him from escaping. Fires were lit all round the pit both day and night. In spite of all these precautions the animal was several times on the point of escaping. On such occasions the watchmen had to attack him from the front with long poles and drive him back into the pit. The coolies were at first timid to approach the pit and whenever the animal made a determined attempt to escape, they were inclined to bolt. It was on such occasions that the Range Officer had to set the example and boldly approach the pit and frighten him back. His example had the desired effect and the men gradually became bolder.

The feeding and watering of the elephant in the pit was rather a serious problem. The suggestion of the coolies to under-feed the animal so that he may become weak and less troublesome, though seemingly cruel, was in the circumstance perhaps pardonable. The Range Officer in his anxiety to keep the animal in the pit till the "Kumkies" arrived was rather inclined to favour this view but fortunately he consulted some of his friends among the students who had experience in this matter and in the end more humane counsel prevailed. The way in which the elephant was given water in the pit was a study in itself and showed how an animal would adapt itself to changed conditions of life. Water was poured down the pit in thin streams from bamboo tubes and it was a wonderful sight how the elephant

caught the water in the barrels of his trunk and spurted it out into his mouth. It is perhaps doubtful whether the elephant received sufficient quantity of water in this manner but it is a useful lesson to be remembered in similar circumstances. In the pit he received a liberal quantity of sugar cane and to this may be attributed his good condition when taken out of the pit.

On the seventh day after the fall two Kumki elephants Abdul Rahiman and Kunju arrived from Mount Stuart and the next day the tusker was safely enkraaled in the new Kraal at Vellapathi about 6 miles from the pit. The details of capturing elephants in pits have appeared more than once in the columns of this Magazine and so I do not propose to repeat them. The D. F. O. Central Coimbatore Division and Messrs Crothers and Hart of the Madras Forest College were present at the noosing and rendered valuable assistance by some of their timely suggestions. Senior Student Sambasiva Rao and myself were present to witness the operations and we modestly claim the satisfaction of having rendered some slight help at the first capturing of an elephant in the Bolampatti Valley.

C. Vasu,

3—4—18. Senior student.

Babul Working Plans of the Tinnevelly District.

The treatment of Babul (Acacia arabica) under the Coppice with Standard System brings home to the mind of the Forest Officer how far the demands of sylviculture have to be sacrificed for the seemingly growing interests of the ryot population.

The existing Working Plans which are now lapsing have adopted the Coppice with Standard System for the working of Babul. The species is found pure along the

beds and waterspreads of tanks and being the only suitable one available in the plains has been much in demand for small timber and fuel. Thus it has been a source of enormous revenue to Government and foresters in the early ninties had drawn up a Working Plan for the systematic exploitation of such areas. The babul trees in the Government tanks were completely enumerated and the possibility fixed by number of trees. All the trees except the standards were to be removed the stumps being 'cut flush with the ground with the bark intact....' The standards were retained as seed bearers and after they had served the purpose, the period being generally three or four years, were to be felled for the supply of agricultural implements to the cultivators. Reproduction was provided for in coppice shoot from the felled stumps and seedling regeneration. How far the fore cast of the future crop has come true it is interesting to inquire.

The writer has been in charge of Babul areas for over two years and he ventures to set forth his observations on the subject. Though the rules about coppicing have been strictly enforced there has been no regeneration by coppice. He has taken the trouble to verify the stumps in the felled coupes and had no occasion to fear that the stumps had been dug up and removed illicitly after the fellings. The stumps were dead though not decayed and showed no signs of having given out any shoot. On inspection of Kalappaipatty, Thulayakulam and Alankulam just a couple of months after the fellings he observed vigorous coppice shoot, but on a subsequent inspection after the tank had dried up again after being filled in the rainy season he could not find a single shoot alive. This and observation of other tanks would lead one to infer that it is the periodical flooding that kills the coppice shoots. But further observations do not confirm this. In the Kaliavar Reserved Forest babul

trees were coppiced—but there has been no reproduction by coppice shoot. This area is high above the flood level of Tambraparni and the Kila Kal (Irrigation channel) and does not suffer from periodical flooding. The only conclusion that can be arrived at is that Babul does not coppice in this locality and that the system specified in the Working Plan will require alteration.

Reproduction by seedling germination has generally not been successful owing to the depredations of the Tinnevelly ryot and his indispensable goat. It may here be noted that these areas are reserved under section 26 of the Madras Forest Act and as such grazing could not be excluded altogether therefrom. There has been good regeneration only in areas where goats have been admitted at a minimum. In the Muthur Tank in Wolfhill R. F. the conservation of Babul growth has been successful and the tank which was originally worked in 1902-04 for the Palamcottah District Jail supply contained an almost impenetrable growth of young Babul with an overwood of the old standard. These babul trees were sold with the exception of 2000 young standards and fetched over Rs. 11,000. A similar amount can be expected to be realised in another 15 years' time.

The Working Plans have lapsed and the control of the Forest Department has ceased and it is late in the day to suggest schemes for the management of Babul areas. Provided goats can be excluded, the Babul areas form a valuable asset to Government and the Revenue officers can have little time and opportunity to dovote to the protection of these areas.

T. I. Chacko.

It has been established that Babul will not coppice in Sind, but will coppice in Kurnool. It is obviously a question of environment.

Editor.

Water ejected by Trees.

We have heard of the "Rain tree," Pithecolobium saman, though I doubt very much if it was ever seen actually raining in India. It is a native of South America. I have had the opportunity of observing the phenomenon of trees raining in the Shola forests of Kannikatty recently. These forests are situated at an elevation of 2000-3000 ft. in the Ambasamudram range of Tinnevelly district.

On the first day of observation I saw a tree, Alstonia scholaris, which was just beginning to put on a fresh flush of leaves sending down a light shower of rain, but I took it to be due to clouds. Passing by the same tree the next day I found the ground quite wet while the ground was dry around other trees adjoining it. Towards evening large drops of water were falling at regular intervals. I was not able to trace the origin of the shower to any part of the tree as it was about 100 feet high. Subsequently, in a different locality a climber was found ejecting water with some force from its stem; the stem was cut and after some time the water stopped flowing. Similiar showers were observed under several other species, e. g., Cinamomum, Albizzia stipulata, Vateria indica, Terminalia belerica &c. The water was ejected at various angles to the vertical, and with some force to form a jet about 18-24 inches in length before it fell in sprays and also at regular intervals as if the water was being pumped out.

This is not Transpiration which is invisible when it takes place and it takes place only in the form of vapour through the stomata in the leaves; in all the instances in which the exudation of water was observed the trees were either leafless or with very young leaves and the water flowed out from the leafless branches through probably,

the openings caused by the fall of leaves, when the connection between the petiole and the stem is severed and the conducting vessels ruptured; or it may be through the cortical pores and breathing organs of the stem.

The amount of transpiration taking place in plants is astonishingly large. The sunflower is said to give off about 60 ℔s. of water during the five months of its life, while a beech tree gives 175 ℔s. a day—an acre of beech about 1500 tons during the summer, equivalent to about 15 inches of rainfall over an acre. (Figures for Indian trees are not available.) Compared with these figures, the quantity of water brought up from the depths of the earth to the atmosphere must be much greater by the method just described and it can be understood how important the preservation of forests is and how materially they add to the rainfall of the country. The rainfall around Kannikatty exceeds 100 inches per annum. How much of this is contributed by the forests would be interesting information.

Another point of interest furnished by the phenomenon referred to is a consideration of the nature of the various forces that cause the rise of sap in trees, apparently defying the law of gravity.

Capillarity is one of these forces. The vessels of the wood through which water is conducted from the root are very narrow and some of them are as much as 3 to 5 yards in length. The surface tension to produce a rise to a height of 3 to 5 yards must be very great. Root pressure is another force by which the sap is forced up the stem. Leaf suction plays an important part in drawing up a column of water to the foliage and finally it is thought that living cells perform a sort of pumping

action known as wood lift. To produce a jet of 24 inches the pressure exerted must be considerable.

R. E. Lemos,
Forest Ranger, Ambasamudram.

Life in the Madras Forest College as compared with the life in a Range.

Almost all the students, either Government or Native states, should have had at least 6 months, practical training in a forest before they have been deputed to the Forest College for training. So when we compare our present life in the College with that of our previous life in the ranges, many vivid advantages and disadvantages appear before our minds. A discussion of a few of these, at least, will not be out of place here.

Of the many advantages, some of them can be summarised as follows :—

(1) Here in the College, we lead a pure student life (with of course practical exercises), in headquarter terms increase our knowledge by attending to lectures and studying books whereas in the Range we will have no scope and time for doing this. Moreover, the duties of a Range Officer, are such that a high responsibility is thrown around his neck. He must deal with the cash properly, spend it in works as sanctioned, pay the subordinates, collect & remit revenue in time, protect the forest and so forth. So he must be very careful in the correct discharge of his duties; but, we, at the College have no such responsibilities except our application to the studies.

(2) Then again, there may be villages of many factions in a Range and no party should be specially favoured as the aggrieved party may cause such a severe damage to

our forests such as setting fire to the forests &c., So one must be very impartial and must carefully act so that one may gain the good will of the people, which is one of the important measures for preventing forest fires. Here at the College, we do not have any of these troubles.

(3) We improve our mental knowledge by frequent references to the books at the College Library and to the various journals and magazines, which are easily accessible to us, whereas, in a Range the scope for this is very much limited.

(4) As our touring places are distant and varied and as we visit various forests of different aspects we improve our practical knowledge by such visits, whereas, in a Range, we will confine ourselves to our ranges only and hence there is very little chance of improving our practical knowledge in Forestry.

(5) We are always under the supervision and guidance of the Principal and the Instructors whose watchful eyes are always for correcting and remedying our faults and defects. But in a Range, we will meet the District Forest Officer, only once in 2 or 3 months as he has work in other ranges also, and hence our defects and faults cannot be properly remedied.

(6) As our Instructors camp with us in our tours, we have every chance of clearing our doubts whenever any difficulty arises but in a Range, in the absence of the District Forest Officer, we have no other chance of clearing our doubts except from books or we have to wait till the District Forest Officer arrives.

(7) True to the saying, that example is better than precept, we learn every piece of work by doing it practically in our tours such as forming nurseries, weeding, cleanings and thinnings &c., in sylvicultural excursions; and road

alignment, building bridges and culverts, Levelling &c., in our Engineering and Survey excursions, whereas, in the range we were only supervising and extracting work from coolies.

(8) Here we have a good scope of taking active part in the games such as foot-ball, badminton, cricket hockey &c., and thus we can cultivate the habit of endurance. But in a range, there is very little chance for this, as we will be camping in the interior of the forest for a major portion of the month.

(9) Here we meet students come from different parts of the Presidency and even from outside it and a close friendship springs among us which gives rise to many social functions such as social gatherings &c., whereas, in a range, this is not possible.

(10) We get good vacations such as summer and Christmas holidays, to give a complete rest to our brains but in a Range, this is not possible.

The main disadvantages may be said as follows :—

(1) As our touring places are far and distant, the cost of the journey and the transport of our kits, drains our pockets at times, but in a Range, we need not travel so long a distance and need not spend so much thereby.

(2) Some of our camping places, are somewhat malarious such as Nedungayam &c., and the cold weather tour is rather a long one. Hence one must be very careful about one's health so that one may not suffer from the attacks of malaria.

In conclusion, by comparing the above merits and demerits of the question, the merits form the majority and hence it goes without saying that the life in the College is

more advantageous to one than one's previous life in the Range.

A. Junior.

A junior might have added that a student is saved the burden of tappal, that his time for a large proportion of the day is his own, that all transport arrangements are made for him, that he is provided with most comfortable quarters, that a medical officer is almost always with him, and that he is secure from all the worry and strain of protection against Fire, Theft, and illicit Grazing. He is certainly under strict discipline, the advantages of which he will some day vividly appreciate.

Editor.

Forest Administration in the Punjab.

(*Extract from the Pioneer, Monday, May 13. 1918*).

There is little doubt that the Forest Department owes such appreciation of its work as is observable to the great expansion that has taken place on the commercial side of its activities. As a nation, the British are woefully ignorant of forestry but few people can better realise successful commercial enterprise when they see it. It is for this reason probably that the commercial aspect of forest work makes the greater appeal to the general public, for it is able to visualise the progress that is being made when the results can be expressed in rupees. It requires little knowledge of forestry for instance, to appraise at its true worth the development in the resin industry in the Punjab, for there can be no question as to the success of an undertaking which can show a return on the year's working of 144 per cent on the capital invested. But for the most part the results of the forest officer's labours are not so obvious. "It may safely be said," it was stated in the introduction to a little book that was published on the

work of the Forest Department, some time last year "that there is hardly any Government Department in India whose work and aims are so little realised by the general public as are those of the Forest Department. For one thing the work of the forest officer lies for the most part in remote places, so that few have knowledge of it. For another the practical results of forest work are apparent only after long periods of time, so that the forest officer has to cultivate the habit of thinking in half centuries and to be content that the full effects of his labours shall be visible only to future generation." Although at the moment commercial development is serving its purpose by bringing the work of the department more into the limelight and forcing attention to the vast resources that are waiting to be exploited, yet the fact cannot be overlooked that the future of our Indian forests depends, to a very large extent, on less obtrusive work in the jungle and on patient investigation both in the field and in the laboratory, for commercial expansion might well lead to disaster unless it were accompanied by equally, or even more, rapid progress in silviculture.

The latest report on forest working shows that in the Punjab there is no cause for anxiety on this account, for although on the commercial side expansion has been abnormally rapid, progress on the technical side has, if anything, been even more pronounced. In fact, the enormous advance that has been made in the silvicultural knowledge of the more important forest trees of the province has, for those who can measure progress in this direction, been one of the outstanding features of forest work in the Punjab in recent years. The problem of the regeneration of deodar, a question which has taxed the ingenuity of more than a generation of forest officers, is now well on its way to solution. Sufficient experience has been gained to justify the replacement of the present,

admittedly unsuitable, methods of treatment by a more intensive system of management, which will not only bring the forests into a condition more nearly approaching the ideal, but will also in course of time tend to produce a yield far surpassing anything hitherto obtained. With the advance of silvicultural knowledge many of the existing working plans have become obsolete, and steps are being taken to revise them as rapidly as the present shortage of establishment will permit. Up-to-date management has already been introduced in the Rawalpindi division, and the revision of Kangra and Kulu plans on similar lines has been taken up and considerable progress, it is stated, was made during the year under report. There is little doubt that the war has greatly retarded any movement in this direction, and when conditions are again normal a great deal of headway will have to be made up, particularly in revising the working plans for the hill forests. The provisions of the existing sanctioned plans were generally carried out, though the prescribed yield could not be fully worked out in the Rawalpindi and Kangra divisions, despite the enormous demand for all classes of timber. It is anticipated that with the splitting up of the Rawalpindi division which has recently been sanctioned, it will in future be possible to work out the whole of the prescribed yield, but in Kangra the quality of chir timber that is grown is so inferior that unless the development of subsidiary industries creates a market for this class of material, there is little hope of being able to dispose of the full outturn.

Altogether there was a reduction of nearly 600 square miles in the area under the control of the Forest Department during the year 1916-17. But this was due almost entirely to the surrender of waste lands in Multan for colonisation purposes, and there was no reduction in the area under forest growth; for as the resolution on the

report points out, it is not the policy of Government to disforest such areas in the plains which can hereafter be utilised as fuel reserves. In fact the necessity for establishing extensive irrigated plantations has already been recognised, and the scheme for maintaining 60,000 acres under plantation in the new colonies is now complete. Further progress is reported in the attempt to evolve some sort of order out of the chaos of the Kangra Forest Settlement. The general principle which has been adopted is to select and demarcate the areas to be retained by the department under a system of rotational closures and to hand over everything outside the demarcation to the Deputy Commissioner for management. In his review on the report, Sir Michæl O'Dwyer expresses the hope that "a further advance in the transfer to district management wlll be made as soon as pessible, as this will afford a practical demonstration to the people of the desire of Government to withdraw restrictions so far as may be, and will thus help to reconcile them to the scheme of rotational closures in the areas selected for conservation and regeneration." It remains to be seen whether the people will find district management any less irksome than the control of the unpopular Forest Department, but in any case the latter will score in being saved the expense and worry of having to manage a large number of areas which can never repay the attention devoted to them, and in being able to concentrate its energies on the forests which really are worth looking after. Settlement operations were also being carried out in the Sutlej Valley forest of the Bashahr State the main feature of which was the voluntary giving up by the Zamindars of a great deal of included cultivation in exchange for portions of forest near their villages, and there is little doubt that this readjustment of areas will be beneficial both to the villagers and to the department.

Occasional Notes.

The catalogue of the College Library has been printed.

The catalogue of the Students' Library has been printed.

The January number of the Agricultural Journal of India, which will in due course be placed on the table of the College Library, contains an illuminative and significant article dealing with the toxicity of trees. We commend its careful perusal to all thoughtful students.

We understand that a 2nd Conservator-ships has been formed in the Panjaub for 1st April 1918.

In the Sundarbans (the largest block of Forest in India, the second largest block being the Nullamalais) about one tiger per week is shot.

In Bengal nearly the whole of the Reserved Forests is closed to all grazing.

Miscellanea.

Capital at $3\frac{1}{2}\%$ compound interest doubles itself in 20 years.
at 4% in just over 17 years.
at 5% in just over 15 years.

"In its forests lies the heart of a nation, and a people without forests is very close to extinction."

A. Theuriet.

The Zurich Town Forest has been a High Forest for over 1000 years, and under systematic management since the 13th century. It is to-day one of the most perfect and profitable forests in the world. The clean annual profit is Rs. 37-8-0 per acre.

Many villages in France and Switzerland, thanks to the profits derived from their Village Forests, pay no taxes: on the contrary the schools, Village Offices etc., are built at no cost to the inhabitants who also get all fuel and even electric light free.

It is merely a question of the true communal spirit and efficient Forest management.

"A treeless earth would be an inferno. The difference between the maximum and minimum temperatures would be enormous. The result would be floods, typhoons etc., etc., and springs would dry up. Instances are well known of the effects of deforestation in Mauritius and in many parts of India etc. and no amount of statistics will disprove the practical results observed................Given two worlds, one with the surface covered with forest and the other covered with ploughed fields, and I do not think that even the Weather Bureau at Washington would necessitate very long in plumping from the forest-clad earth: a penn'orth of practice is worth a pound of theory."

It has been suggested that coffee leaves should be suffused for "Tea" and that tea berries should be ground for "Coffee"

For each minute of time the world strikes 3,000,000 matches.

The Acacia dealbata was introduced on to the Nilgiris in mistake for Acacia decurrens.

The original price of Euclypts globulus at Ootacamund was 12 annas per plant.

The world's annual supply of paper is 9,000,000 tons. For paper making India's geographical position is exceptionally favourable, as it is half way between the east and west: China, Japan, Australia should all come to India for paper or pulp.

The average bamboo forest should be worth from Rs. 2 to 3 per acre in Royalties.

Locusts are said to hold up trains in Bikanir.

An arrest of growth is the immediate result of working elephants too young.

A bamboo culm transplanted to Europe seeds and dies at the same moment as the parent culm.

The sporadic seedling of bamboos is said to give infertile seed only.

Pinus longifolia coppices.

Women in the Vizagapatam District are said to carry 120 lbs. firewood on their heads.

Madras produces more indigo than any other province.

"Carat" as a weight for diamonds comes from the fruit of Ceratonia siligna—the locust tree—Daisy-Day's eye.

The Albizzia lebbek is said to be the tree of the Knowledge of Good and Evil.

"For many years Billian, a wood that grows in Borneo, was considered the strongest timber in the world, but a new rival has been found in Australia known as Yate. Its average tensile strength is 24,000 lbs. per square inch, equal to good cast iron. Many specimens are much stronger, one being tested up to 17¼ tons per square inch. The tree grows to a maximum height of 100 feet, with a diameter of 2½ to 3 feet. There are many purposes in machine construction, to which such timber might be applied: probably also in the structure of vehicles, and particularly of wooden wheels.

(Indian Textile Journal).

Balsa (Ochroma lagopus) is a tropical American tree having a very soft wood that the Missouri Botanical Garden has shown is only about half as heavy as cork.

This wood is being used in life-rafts, life-belts, and for buoys of various kinds, and is claimed to be preferable to cork in other respects as well as in lightness-(Capital).

The Highest Tree in the world is a Redwood on the Eel river-340′ measured by Surgent in 1896. The highest known Eucalypts are an Amygdalina 303′ and a regnans 326′ (Elves and Henry). The Edallutty Teak, which used to be visited by former Divisions, is situated about 7 hours journey to the east of Nedungayam : when last measured was about 187′ in height and 15′ 8″ in girth.

A right-handed chank shell is worth one lakh, a left-handed chank nothing at all.

To render all mushrooms safe: boil them for 2 hours in water to which salt or vinegar has been added: strain off: wash them in hot water and cook.

Sequoia Washingtonia is supposed to live 3000—5000 years.

Largest recorded teak log $82\frac{1}{2}'$ X $10'$ m. g. girth over $12'$ at base: $7'$ at top end; volume 517 cubic feet, weight $10\frac{1}{3}$ tons; launched into a tributary of the Sheveli river by Messrs. Darwood in 1898.

African elephant has 3 toes on the hind foot.
Indian „ „ 4 „
An African elephant 12′ 2″ has been shot.

The African elephant has probably never been tamed. It is believed that the elephants used by Hannibal for war purposes were the Indian species.

Evidence of intelligence in plants.

(i) A living insect was pinned ½″ from the leaf of the American sundew. In 2 hours the leaf had moved near enough to secure its prey by means of its tentacles.

(ii) A tiny pebble placed among the tentacles of a sundew is at once seized by them, but peptic fluid is not exuded. Hence the plant possesses a power of discrimination.

A tea-spoon of quinine smoothed off equals 20 grains.

Cholera remedies.

I.	Acid Acetic dilute	....	6 drams.
	Tincture Camphor Co.	....	3 „
	Spirits Aetheris Nitrosi	...	2 „

Spirits Chloroform .... 1½ ,,
Liquor Hydrargyri Perchlorid .... 2 ,,
Aqua or decoction Cinnamom 6 ounces.

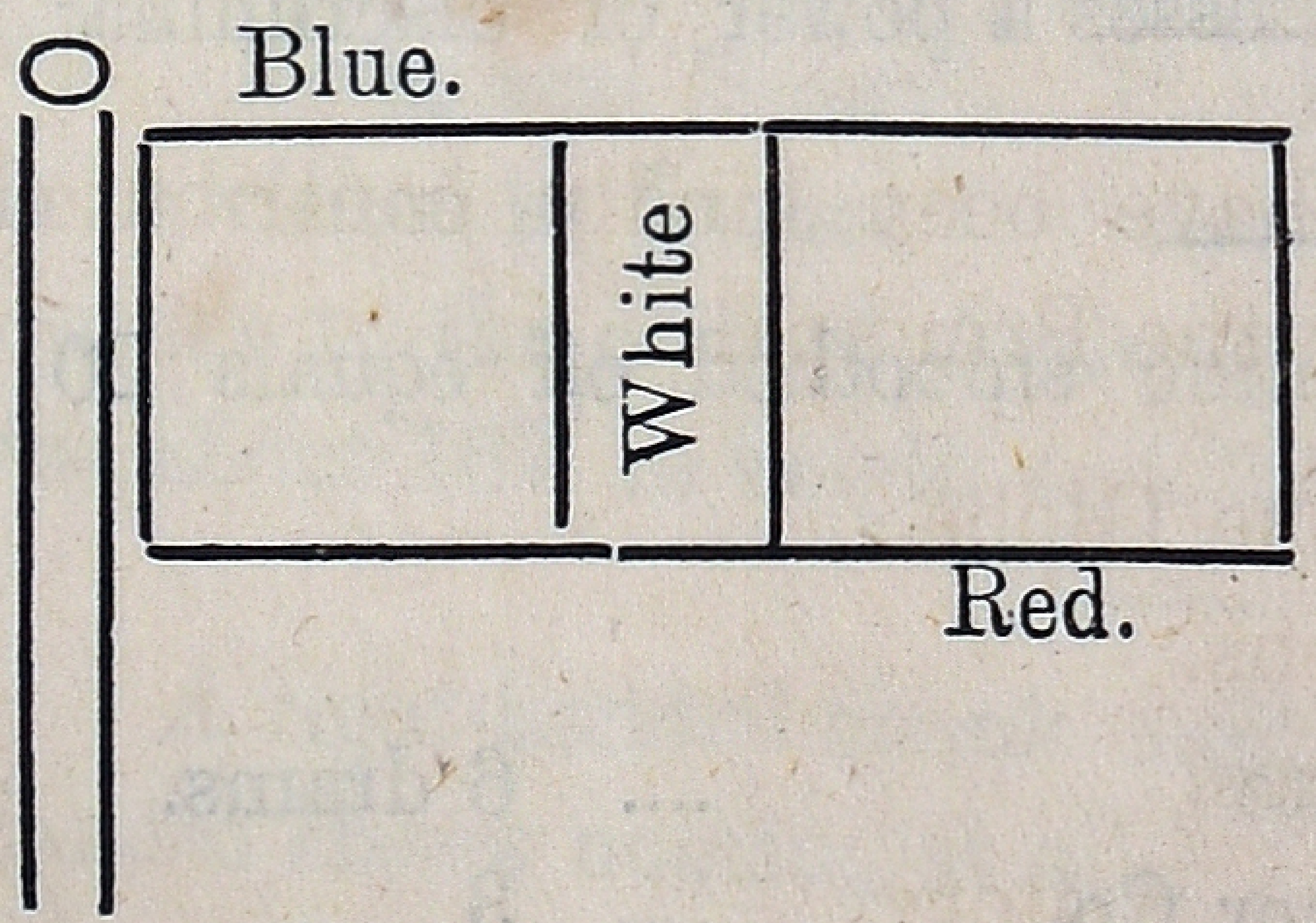
Mix in a bottle and give about quarter to half a wineglassful (or half to one ounce) of the above mixture every half an hour till amelioration sets in, and then less frequently every 1, 2 or 3 hours.

In places where there is no chemist's shop the ingredients and an ounce measure and a minim glass may be purchased and kept ready for use and the mixture compounded whenever required.

II. 30 drops strong acetic acid.
10 drops sweet spirit of nitre.
Wineglass of water.

The very first dose will check the disease in many cases. One dose alone proved successful in curing the disease. No water is to be given for the first three hours. If very thirsty you may give a piece of ice, if procurable, or a few drops of water to wet the month. After three hours arrowroot conjee should be given, also water if required. If the disease is not controlled by the first dose, give second dose after six hours time.

The French Flag Blue, white and red : thus.



The red occupies the widest proportion.

The white occupies the narrowest ,,

The blue ,, mean ,,

The proportions [here intentionally exaggerated]

of the three colours are so adjusted by the Science of optics, to ensure the greatest visibility at the maximum distances.

The origin of the tricolour is that each of the three villages called Martigue (near Marseilles) had one of these colours as its own flag. The villages were contiguous.

"Every Forest Officer is the Priest of a true religion"

Edwin Arnold.

List of Contributions to the Gass Forest Museum since April 1917.

No.	Contribution.	Contributors.
1.	One mat made by beating out the innner bark of Kigelia pinnata.	Mr. Sankara Alwa, Student M. F. C. 1916—18 division.
2.	A plate showing charcoal burning operations at Sadivayal by M. F. C. Students.	Mr. A. Seshagiri Rao, Student M. F. C. 1917—19 division.
3.	Three potographs of a fungus (Dictyophora phalloidea Desv.)	F. L. C. Cowley-Brown, Esq., I. F. S.

List of contributions to the Collage Library.

The following books have been kindly contributed to the Students' Library by the Principal.

Glimpses of the Globe.
Starry Heavens.
Social Sketches.
Tale of French History.

Gazette Notifications.

March 5, 1918.

Under article 260 of C. S. R., M. R. Ry., K. R. Venkatarama Ayyar, Avergal, District Forest Officer, South Vellore, is granted privilege leave for two months and fifteen days from or after the 16th April 1918.

M. R. Ry., K. A. Chengappa Avergal, District Forest Officer West Vellore, to be in charge of South Vellore, in addition to his present duties, during the absence of M. R. Ry., K. R. Venkatarama Ayyar Avergal on privilege leave.

M. R. Ry., P. Govinda Menon, probationary Extra-Assistant Conservator of Forests, South Malabar, is granted privilege leave for one month from or after 16th March 1918.

M. R. Ry., R. Manikkam Pillai, Ranger, fourth grade, Perambalur, is granted privilege leave for fifteen days from the date of relief.

M. R. Ry., M. Rangasayi Nayudu, Ranger, fourth grade, is granted privilege leave on medical certificate for two months and twenty four days from 1st February 1918.

W. A. Mekkeri Sahib, Ranger, fourth grade, is granted an extension of leave on medical certificate for six months in continuation of the leave granted to him in this Office Service Order No. 101, dated 4th August 1917.

March 12, 1918.

Under articles 242 (*a*) and 260 of the C. S. R. Muhammad Abdul Hafiz Sahib Bahadur, probationary Extra Assistant Conservator of Forests, South Cuddapah, is granted privilege leave for one month and twenty-two days from or after 15th March 1918.

The following grade promotions are made in the class of Rangers with effect from 1st March 1918.

M. R. Ry., C. Sankunni from second grade permanent to first grade *sub pro-tem*.

Mr. C. Mahony from second grade *sub pro-tem* to second grade permanent.

M. R. Ry., C. Ramaswami Nayudu from third grade permanent to second grade *sub pro-tem.*

M. R. Ry., T. K. Ramaswami Ayyar, from third grade permanent to second grade *sub pro-tem.*

Mr. J. D. David, from third grade permanent to second grade *sub pro-tem.*

M. R. Ry., M. Muthuswami Ayyar, from third grade permanent to second grade *sub pro-tem,*

M. R. Ry., M. Maduramuthu Pillai, from third grade *sub pro-tem* to third grade permanent.

M. R. Ry., C. P. Garudachella Mudaliyar, from fourth grade permanent to third grade *sub pro-tem.*

M. Hussain Khan Sahib, from fourth grade permanent to third grade *sub pro-tem.*

M. R. Ry., P. Ramunni Menon, from fourth grade permanent to third grade *sub pro-tem.*

M. R. Ry., R. Subramaniya Ayyar, from fourth grade permanent, to third grade *sub pro-tem.*

M. R. Ry., K. Karunakara Nambiyar, from fourth grade *sub-pro-tem* to fourth grade permanent.

M. R. Ry., A. P. Srinivasa Ayyangar, from fourth grade *sub-pro-tem* to fourth grade permanent.

M. R. Ry., A. Swamikutti, from fifth grade permanent to fourth grade *sub pro-tem.*

M. R. Ry., G. Rama Rao, from fifth grade permanent to fourth grade *sub pro-tem.*

Mr. A. Nicholas, from fifth grade permanent to fourth grade *sub pro-tem.*

Mr. J. A. Paul D'cruz, from fifth grade permanent to fourth grade *sub pro-tem.*

Mr. C. S. King, from fifth grade permanent to fourth grade *sub pro-tem*

Saiyid Ibrahim Albeiz Sahib, from fifth grade permanent to fourth grade *sub pro-tem.*

Mr. H. Meyers, from fifth grade *sub pro-tem* to fifth grade permanent.

M. R. Ry., D. Ramalingam, from sixth grade permanent to fifth grade sub *pro-tem*.

M. R. Ry., K. Balakrishna Rao, from sixth grade permanent to fifth grade *sub pro-tem*.

M. R. Ry. K. S. Ramayya from sixth grade permanent to fifth grade *sub pro-tem*.

Mr. C. H. Ashe, from sixth grade permanent to fifth grade *sub pro-tem*.

Saiyid-ud-din Ahmad Sahib Bahadur Special Forest Officer, Parlakimedi, Maliahs is granted privilege leave for three weeks from 3rd April 1918, with permission to prefix the Easter holidays to the leave.

M. R. Ry. S. Chidambara Ayyar, Ranger, fifth grade, is transferred from Rapur Range, Nellore District, to the charge of Chingleput Range, Chingleput District. To join expeditiously on relief by No. *2*.

M. R. Ry. T. N. Seshagiri Rao, Ranger, second grade, is posted to relieve No. (1) and hold charge of the Rapur Range in addition to Nellore Range as a temporary measure.

T. V. Govinda Rao, Deputy Ranger, first grade, and acting Ranger sixth grade, is confirmed as Ranger, sixth grade, from 4th March 1918.

March 19, 1918.

Under article *260* of the C. S. R. M. R. Ry. J. Sadasiva Ayyar Avargal, District Forest Officer, North Mangalore is granted privilege leave for two months from or after 10th April 1918.

M. R. Ry. K. A. Chengappa Avargal, District Forest Officer West Vellore, to be also Deputy Collector in the North Arcot District.

(This cancels notification No. *271*, dated 13th June 1917, published at page 775 of Part 1 of the Fort St. George Gazette, dated 19th June 1917).

Muhammad Habib-ullah Sahib Bahadur, Extra Assistant Conservator of Forests, to be District Forest Officer, South

Coimbatore, with effect from 3rd April 1918, *vice* Mr. H. F. A. Wood appointed to act as Conservator.

The following candidates are declared to have passed the Forest Departmental test provided for in section 68 of the Madras Forest Code held in 28th January 1918.

Code and accounts.

Name.	Rank.	Results.
1. R. Raghavendra Rao.	Permanent fourth clerk and acting third clerk, District Forest Office, Bellary.	Second class.
2. R. Ramachandra Rao.	Permanent clerk, Chendragiri Divisional Office.	do.

Board's Standing Orders.

3. R. Raghavendra Rao.	Permanent fourth clerk and acting third clerk, District Forest Office Bellary District.	Second class.

M. R. Ry. S. Chinnadorai Pillai, Ranger, third grade, in charge of Balapalli Range, South Cuddapah District, is posted to the charge of Kodur range in addition to his own during the absence of Muhammad Abdul Hafiz Sahib Bahadur, Probationary Extra Assistant Conservator on leave or until further orders. He will relieve the Extra Assistant Conservator forthwith.

K. Shaik Mahammad, Deputy Ranger, first grade in charge of Bontha range, Ganjam, is promoted to act as Ranger sixth grade, *vice* M. R. Ry. C. G. Ganapathi, Ranger, fifth grade, deputed to the Military grass farms.

M. R. Ry. C. M. Belliappa, Ranger, first grade, North Salem, is granted privilege leave for three months from date of relief by Ranger Devanayagam Nayudu.

M. R. Ry. G. N. Subba Rao, Probationary Ranger, sixth grade, is transferred from South Vellore, to South Salem Division for the charge of Attur range.

S. V. Sibgatullahi Sahib, Acting Ranger, sixth grade, on special duty in West Vellore division is posted to the charge of Alangayam Range.

M. R. Ry. G. Devanayagam Nayudu, Ranger, sixth grade, on relief by No. (2) is posted to the charge of Denkanikota Range, North Salem division.

This office Service Order No. 27, dated 14th February 1918, granting privilege leave for two months to K. R. Krishnan Nayar, Ranger, fourth grade, the Nilgiris, is cancelled.

The following Candidates have passed the Departmental test held in January 1918 :—

Forest Code and Accounts.

1. P. Seshadri Ayyangar, second clerk, District Forest Office, the Nilgiris. ... 1st class.
2. P. Sankunni Menon, tour clerk, Forest Conservator's Office, Western circle. ... do.
3. K. Sankaranarayana Rao, acting third clerk, District Forest Office Mangalore North ... Second class.
4. M. Kutti Krishnan Nayar, third clerk, District Forest Office, Malabar North ... do.

Boards Standing Orders.

1. Sankunni Menon, tour clerk, Forest Conservator's Office Western Circle ... 1st class.
2. M. Kutti Krishnan Nayar, third clerk, District Forest Office Malabar North. ... do.
3. B. Parameswara Rao, second clerk, District Forest Office, Mangalore South ... ... do.
4. K. Sankaranarayana Rao, acting third clerk, District Forest office Mangalore North ... Second class.

M. R. Ry. K. R. Krishnan Nayar, Ranger, fourth grade, the Nilgiris, will be considered to have been on privilege leave under article 260 of the C. S. R. for seven days with effect from 3rd January 1918 in continuation of the christmas holidays.

March 26, 1918.

Mr. J. H. Longrigg, District Forest Officer, South Mangalore, to be in charge of North Mangalore in addition to his present duties during the absence of M. R. Ry. G. Sadasiva Ayyar Avargal on privilege leave.

Mr. D. E. Lewin, Ranger, sixth grade in charge of Muddanoor Range, West Cuddapah District, is transferred to Vempalle range of the same District. To proceed forthwith and relieve the acting Ranger M. R. Ry. M. Krishna Ayyar at once.

M. R. Ry. M. Krishna Ayyar, acting Ranger, sixth grade, in charge of Vempalle range on relief by No. 1, to assume charge of Muddanoor range.

The leave on medical certificate for one year from 4th February 1917 granted to Ranger R. Virasami Nayudu in this office Service order Nos. 27 and 212 of 1917, dated 11th February 1917 and 20th September 1917, respectively, is extended by six months.

M. R. Ry. K. R. Krishnan Nayar, Ranger, fourth grade, the Nilgiris is granted leave on medical certificate under art. 336 of the C. S. R. for one month from date of relief.

April 2, 1918.

M. R. Ry., O. Venkataramana Ayyar, Ranger, first grade, in charge of Cuddapah Range, West Cuddapah District, is posted on special duty to Guntakal in connexion with the hay operations conducted by the Forest Department.

M. R. Ry., S. Ramachandra Ayyar, Ranger, fourth grade, on special duty in West Cuddapah District, is posted to the charge of Cuddapah Range to relieve No. (1) at once.

In modification of this Office Service Order No. 35, dated 11th March 1918, Mr. R. Krishnaswami Ayyar, B. A., Acting Deputy Ranger in the Travancore Forest Department and appointed as Probationary Ranger, sixth grade, South Cuddapah District, is posted to work under the orders of the District Forest Officer, West Cuddapah.

April 9, 1918.

Under article 260 of the C. S. R. M. R. Ry., E. C. M. Mascarenhas, District Forest Officer, South Salem, is granted privilege leave for two months and twenty-eight days from 28th March 1918.

M. R. Ry., M. R. Sundaram Ayyar Avargal, Extra Assistant Conservator of Forests, on return from leave to be District Forest Officer, South Salem, with effect from 28th March 1918.

P. K. Kuttappan Pillai, promoted to act as Deputy Ranger, first grade and appointed as the Junior Instructor of Vernacular Training School, 1918, in this Office Service Order No. 185, dated 11th December 1917, is appointed to act as Probationary Ranger, sixth grade from first March 1918 *vice* M. R. Ry., A Ranganayakulu Nayudu, Ranger, fourth grade, on other duty as Senior Instructor, Vernacular Training School, 1918 or until futher orders.

M. R. Ry., K. P. Krishna Ayyar, Ranger, second grade, North Salem division, is granted privilege leave for three months from date of relief.

April 16, 1918.

M. R. Ry. E. B. Ramachandra Rao, Extra Assistant Conservator of Forests on probation will revert to the post of second grade Ranger with effect from date of relief.

Mr. D. T. Barry, District Forest Officer, Tinnevelly *cum* Ramnad, is granted privilege leave for one month from 15th April 1918 with permission to prefix the holidays on the 12th, 13th and 14th April 1918, provided that the conditions of article 220 of the C. S. R. are fulfilled.

The privilege leave for three weeks which was granted to Saiyid-ud-din Ahmed Sahib Bahadur, Special Forest Officer, Parlakimedi Maliahs, in Board's Proceedings Forest No. 338, Routine, dated 5th March 1918, is extended by one week.

M. R. Ry., C. T. Thiruvengadam, Ranger, sixth grade, is granted privilege leave for three months from date of relief.

B. Gulam Dustagir, Junior Instructor, Vernacular Training School, is posted for the charge of the Chelama Range on termination of Vernacular Training School Session.

April 23, 1918

Under note 1 to article 336 of the C. S. R., Mr. R. Mitchell, Extra Assistant Conservator of Forests (on probation) is granted leave on medical certificate for three months with effect from 12th February.

Under article 260 of the C. S. R., Mr. J. A. Master, District Forest Officer, Bellary, is granted privilege leave for one month with effect from date of relief.

Mr. G. C. Robinson, Working Plans Officer, Southern Circle, to be in charge of Tinnevelly *cum* Ramnad in addition to his present duties during the absence of Mr. D. T. Barry on privilege leave or until further orders.

M. R. Ry., B. Punniah, Ranger, fifth grade, is considered to have been on privilege leave under article 260 of the Civil Service Regulations from 4th February 1918 to 31st March 1918 both days inclusive.

M. R. Ry. T. E. Varadachari, Ranger, sixth grade, Ganjam, is granted privilege leave for three months under art 260 of the C. S. R. with effect from date of relief.

M. R. Ry., V. Narayana Ayyar, Ranger, second grade, Parlakimedi Maliahs is posted to Russellkonda Range, Ganjam, on reversion.

April 30, 1918.

The following postings of Forest Officers are ordered.

Mr. J. A. Master, District Forest Officer, Bellary, on return from leave, to be District Forest Officer, South Salem.

Mr. E. C. M. Mascarenhas, District Forest Officer, South Salem on return from leave to be District Forest Officer, Bellary.

Mr. D. A. Stracey, Extra Assistant Conservator of Forests to act as District Forest Officer, Bellary from the date on which Mr. J. A. Master proceeds on leave to the date on which Mr. E. C. M. Mascarenhas takes charge of the district.

Mr. F. A. Seager, District Forest Officer, Lower Godaveri, to be in charge of the Kistna District in addition to his own duties.

The privilege leave for one month granted to M. R. Ry., M. Krishna Rao, Ranger, fifth grade, Kurnool East, in this Office Service Order No. 38, dated 9th March 1918, is extended by six weeks.

The Ranger's leave is to take effect from 21st February 1918 instead of 20th idem as previously ordered.

M. R. Ry., M. Subbarayalu Nayudu, Ranger, third grade, on return from leave, is posted to the charge of Rapur Range, Nellore District.

May 7, 1918.

Mr. G. C. Robinson, Working Plans Officer and Acting District Forest Officer, Tinnevelly, having been called out for Military training, Mr. D. T. Barry, Deputy Conservator of Forests now on leave, is recalled to duty. Mr. Barry should relieve Mr. Robinson at Tinnevelly on 4th May 1918.

Mr. Barry will hold charge of the Working Plans Office at Tinnevelly in addition to his duties as District Forest Officer, during the absence of Mr. Robinson or until further orders.

Mr. Mitchell, Probationary Extra Assistant Conservator of Forests will be considered to have been on privilege leave on 1st August 1917.

M. R. Ry., S. M. Krishnaswami Ayyar, Ranger, fourth grade, Tinnevelly Range, is granted privilege leave for one month.

Deputy Ranger K. Sankaralinga Kone is posted to the charge of the Range during the absence of No. (1)

M. R. Ry., C. D. Parthasarathi Chetti, Ranger, fourth grade, is granted combined leave for two months, i. e., privilege leave for eleven days and leave on medical certificate for the remaining period from 6th April 1918.

(1) M. R. Ry., G. Devanayagam Nayudu, Ranger, sixth grade, on relief by Ranger C. M. Belliappa from leave, is transferred to West Vellore Division for the charge of Alangayam Range.

Saiyid Vazi-ud-din Sibgathullahi Sahib, Acting Ranger, sixth grade, on relief by No. (1) to special duty in West Vellore Division.

The following postings of Rangers and Deputy Rangers who complete their course in the Madras Forest College, Coimbatore, in June next, are ordered:—

(1) M. R. Ry., S. G. Venkataramanan, Probationary Ranger, sixth grade, to North Salem, to work under the orders of the District Forest Officer.

(2) P. B. Saiyid Yahia Sahib, Probationary Ranger, sixth grade, to South Salem, to work under the orders of the District Forest Officer.

(3) B. T. Sitaraman, Deputy Ranger, first grade, to the charge of Krishnagiri Range, North Salem Division.

M.